Eliminating the Retained Ureteral Stent
MUSC Department of Urology Residency Program

MUSC Health
Medical University of South Carolina

BACKGROUND

- Ureteral stents are placed most often in context of urolithiasis and after urinary surgery in which removal is planned either by the patient at home via a string tether left secured to the stent or by the urologist in the office through a procedure called a cystoscopy.

- Stents are also used to relieve obstruction in both the benign and malignant setting. In these settings, stents are exchanged in scheduled intervals in the operating room.

- Regardless of indication, all ureteral stents are temporary – meaning that they are designed to be removed or exchanged by a specific date.

- If not removed, ureteral stents become encrusted. If a ureteral stent becomes significantly encrusted, it can lead to difficulty in extraction requiring multiple procedures, obstruction, kidney injury, urinary tract infections, sepsis, and even death[1].

- While there are numerous factors that determine rate of encrustation, ~30% of retained stents >25 weeks after implantation require surgical explantation[2].

- There have been several attempts at creating paper, electronic, or app-based registries. With the advanced EMR systems, like EPIC, several institutions have been able to decrease their retained stents to <1%.
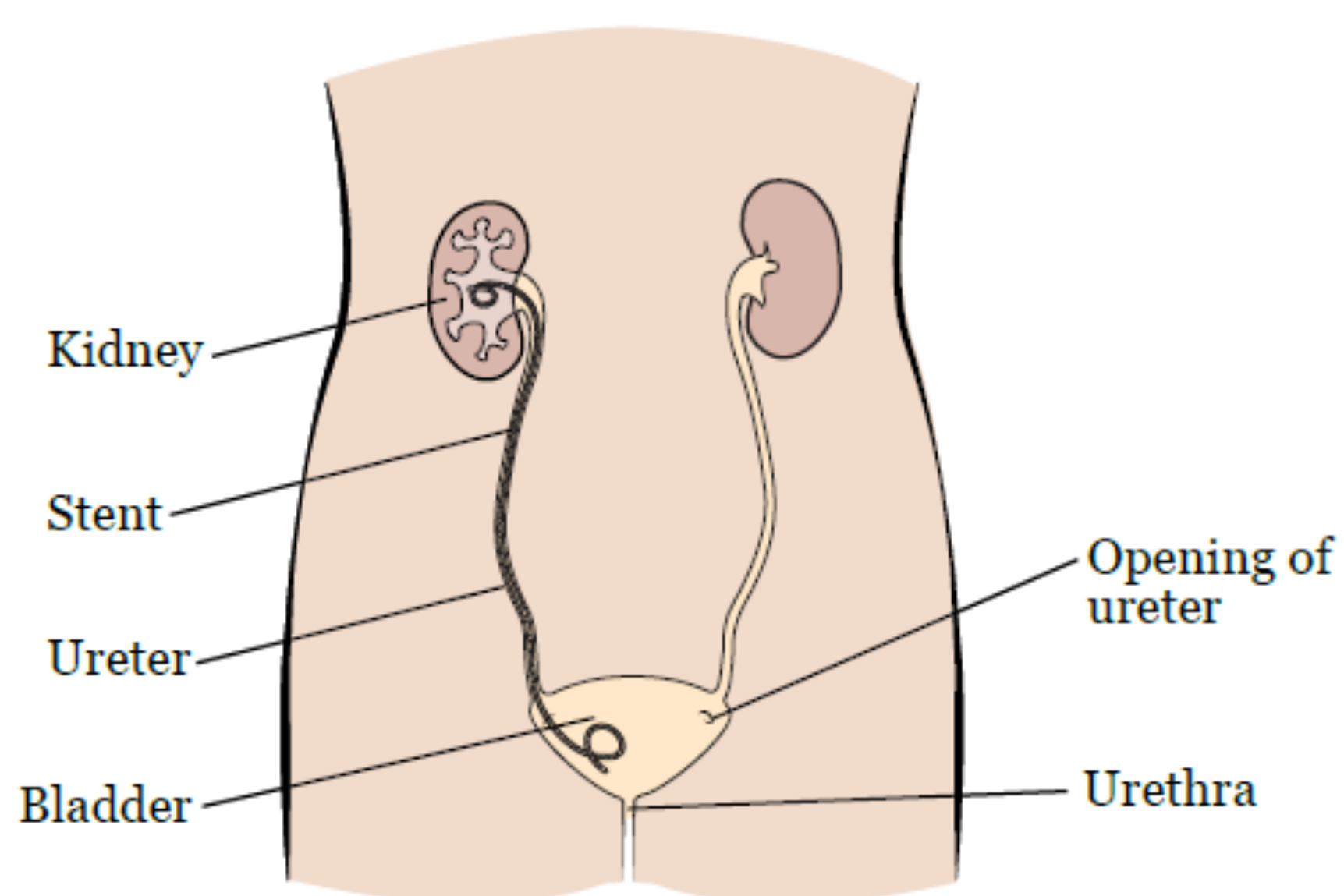

Kidney
Stent
Ureter
Bladder
Opening of ureter
Urethra

Figure 1. Ureteral stent *in situ*.

AIM STATEMENT

- Develop and implement a process to decrease number of retained stents per quarter to zero.

- MUSC Pillar: Innovation

RECENT CASE REPORTS WITHIN ENTERPRISE

54 y/o female underwent right ureteral stent for 1/2021.

- Seen 3/2021 and 4/2021 at which time arranged for stent removal.
- No show to appointment x2.
- Admitted with urosepsis 2/4/2023 – 2/8/2023.
- Underwent right percutaneous nephrostomy tube as well as right ureteroscopy and removal.

19 y/o male underwent right ureteral repair with stent placement 4/2019.

- No show 6/2019 for stent removal.
- Seen 6/2021 with dysuria but no show to cystoscopy appointment thereafter.
- Seen 12/2022 with similar complaints and arranged right ureteroscopy 1/2023. No show.
- Admitted 2/17/2023 – 2/20/2023 with right pyelonephritis and underwent right ureteroscopy, laser lithotripsy, and stent exchange.

METHODS & INTERVENTIONS

- Queries made into current method of implanting specifically ureteral stents in the operating room including fields filled out within the EPIC "Implant" tab.

- Identified current workflow for removing stents and created algorithm (Figure 2) for management of stents based on current operations.

- Fields needed within EPIC "Implant" tab added.

- EPIC report "MUSC UROLOGY CHARLESTON STENTS" created to include ureteral stents implanted within a specified time period within all operating rooms (adult and pediatrics) within Charleston system.

- Report filtered for those stents implanted that had not yet been explanted as of 3/10/2023 and charts reviewed as to reason stent remained documented as implanted.
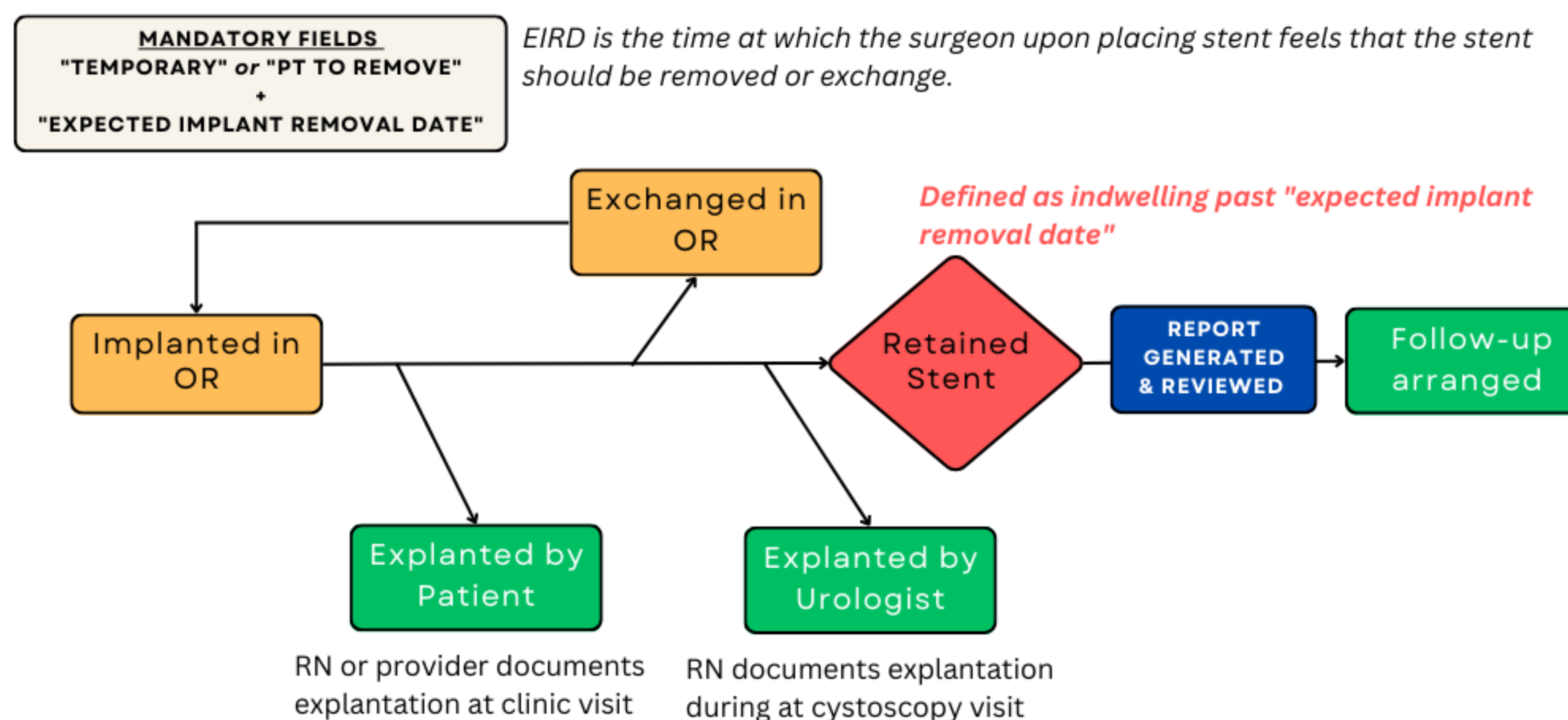

MANDATORY FIELDS
"TEMPORARY" or "PT TO REMOVE"
+
"EXPECTED IMPLANT REMOVAL DATE"

EIRD is the time at which the surgeon upon placing stent feels that the stent should be removed or exchange.

Exchanged in OR

Defined as indwelling past "expected implant removal date"

Implanted in OR

Retained Stent

REPORT GENERATED & REVIEWED

Follow-up arranged

Explanted by Patient
RN or provider documents explantation at clinic visit

Explanted by Urologist
RN documents explantation during at cystoscopy visit

Figure 2. Ureteral stent tracking and management algorithm.

RESULTS & CONCLUSIONS

- For February 2022, 66 stents were implanted. 28 were designated as "Pt to remove" (i.e., on string) and 38 "temporary."

- **0** of these stents were marked as explanted.

- Charts reviewed for the reasons why stents remained "implanted" and are categorized as below:

- ■ Follow-up scheduled
- ■ Future exchange scheduled
- ■ At risk of retained stent
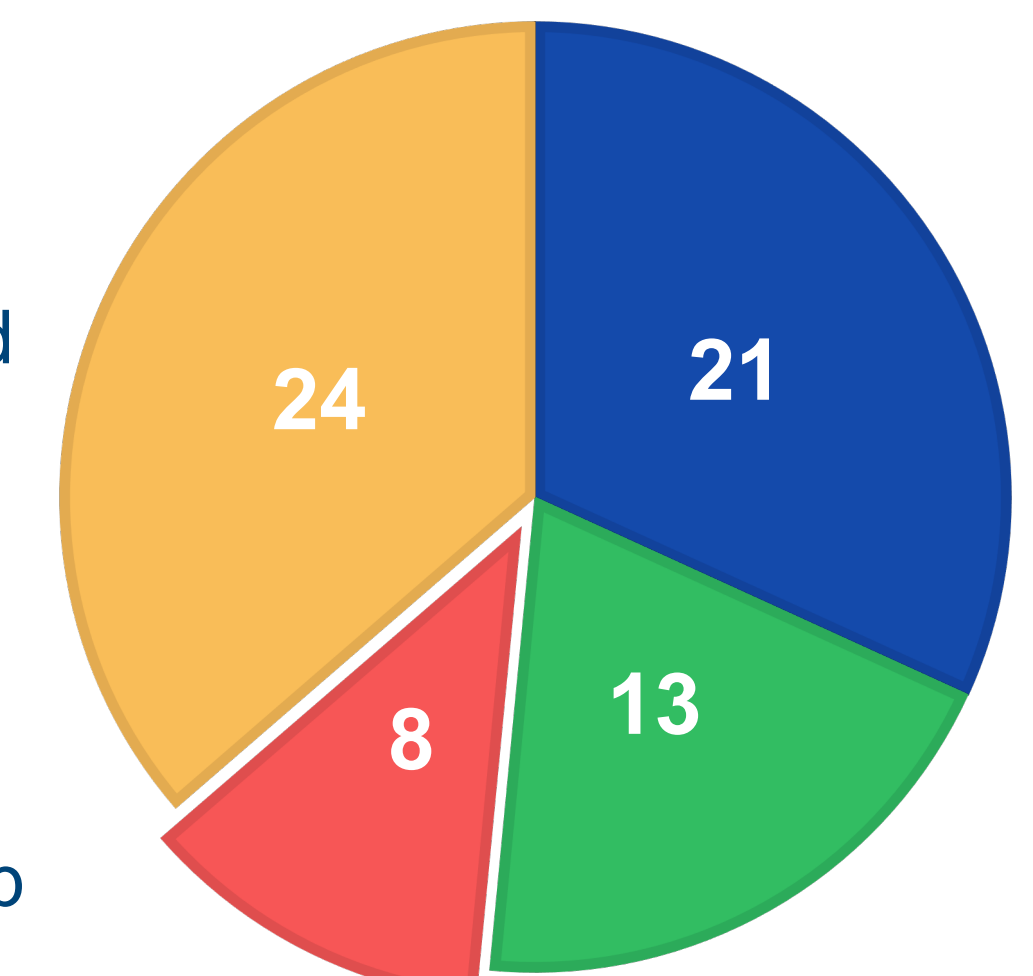- ■ Explanted but not documented in "Implant" tab

21
13
8
24

Figure 3. Breakdown of implanted ureteral stents.

- Of those not marked as explanted in "Implant" tab, **17** occurred in clinic, **4** in OR, and **3** in the hospital setting.

- 8 stents "at risk of retention." Upon further analysis, **6** were on strings without follow-up (likely removed by patients) and **2** were not yet scheduled for exchange (both within expected implant removal date).

- **0** true "indwelling" stents identified as retained.

BARRIERS

- Vast redundancy of stents left implanted during exchanges clouding the report thus increasing the time needed to review charts retrospectively.

- Development of proper fields in "Implant" tab within EPIC and appropriate providers obtaining access.

NEXT STEPS

- Change EPIC "Implant" tab fields to ensure "temporary" vs "pt to remove" required as well as EIRD to allow for report filtering downstream. This will decrease burden on end-user.

- Reinforce proper documentation protocol in urology clinic including explantation of "Pt to remove" stents as part of intake.

- Re-evaluate progress in 1 month with goal of 80% stents explanted to be correctly documented.

REFERENCES

1. Divakaruni N, Palmer CJ, Tek P, et al. Forgotten ureteral stents: who's at risk? J Endourol. 2013; 27:1051-4.
2. el-Faqih, S. R., et al. (1991). "Polyurethane internal ureteral stents in treatment of stone patients: morbidity related to indwelling times." J Urol 146(6): 1487-1491.